Part II The effect of age on Peyer's patches

There appear to be two generally accepted views concerning the effect of age on Peyer's patches in the human small intestine. According to one view they are best marked in the young subject, become indistinct in middle age, and usually disappear altogether in advanced life (Gray, 1962). According to the other view they atrophy in middle life, and in old age, although usually present, they are indistinct (Drennan, 1951; Ham and Leeson, 1961). Why these patches disappear or become indistinct in old age whilst lymphoid tissue persists in other parts of the gastrointestinal tract such as the mesenteric lymph nodes (Denz, 1947), appendix (Berry and Lack, 1906), and large intestine (Dukes and Bussey, 1926), has never been satisfactorily explained. The present study was therefore undertaken to find out the effect of age on the number, size, and distribution of Peyer's patches in the human small intestine.

CASES STUDIED

Specimens of small intestine were obtained from 58 necropsies on young people and adults varying from 15 to 95 years of age. As far as possible an attempt was made to collect at least six specimens from each decade of life. These investigations were limited to necropsies carried out within a few hours of death, and to patients with no clinical history or pathological evidence of disease referable to the gastrointestinal tract or reticulo-endothelial system. In the majority of cases the specimens were obtained from coroners' necropsies on patients who had died as a result of an accident, had had coronary artery occlusion, or some cerebrovascular catastrophe.

METHODS

The methods of investigation used were similar to those reported in Part I.

RESULTS

NUMBER The number of Peyer's patches found in the 58 specimens examined are recorded in Table I. Mean values for selected age groups are shown graphically in Figure 1. This graph also includes the results obtained from the examination of 38 specimens previously reported in Part I. It will be seen that the mean number of patches containing more than five lymphoid follicles varied from over 200 before 20 years of age to around 100 between 70 and 95 years of age. Although there was considerable individual variation in the number of patches found, the general tendency was to a rapid falling off

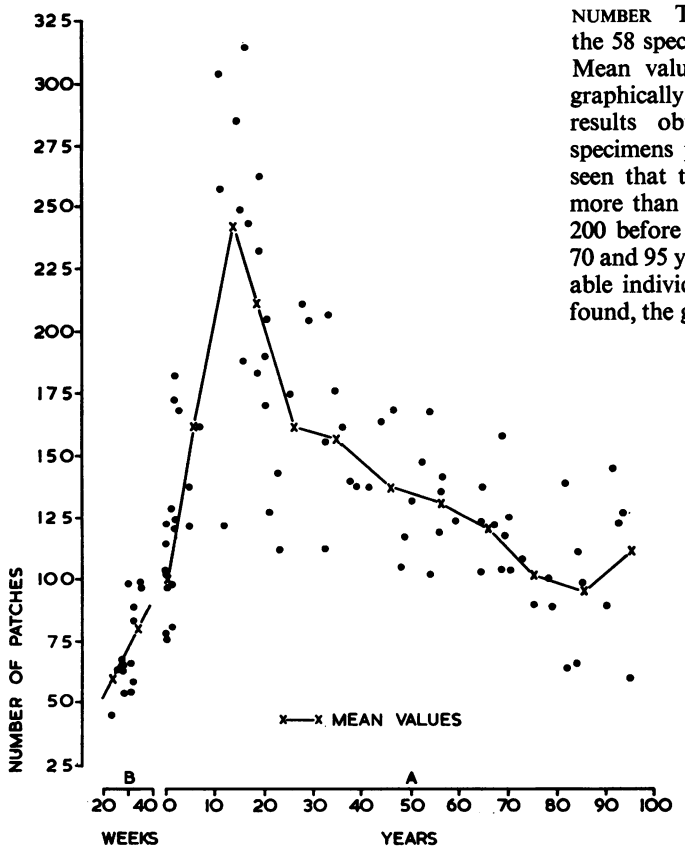

FIG. 1. *The number of Peyer's patches found in 96 specimens of human small intestine. B Before term, from 24 to 37 weeks' gestation. A After term, from 0 to 95 years.*

TABLE I

NUMBER OF PEYER'S PATCHES FOUND IN THE SMALL INTESTINE IN 58 SPECIMENS

Case No.	*Age (yr.)*	*Sex*	*Body Weight (kg.)*	*Length of Small Intestine (cm.)*	*No. of Patches*		
					With More than Five Follicles	*With More than 25 Follicles*	*Over 4 cm. Long*
39	15	F	73	752	185	72	12
40	15	M	75	682	316	128	10
41	16	F	54	850	242	92	9
42	17	M	84	873	233	103	15
43	17	M	54	650	263	92	8
44	18	M	58	655	183	89	1
45	19	M	57	654	170	97	6
46	19	M		845	181	79	6
47	19	M	73	762	206	70	9
48	21	M	93	657	128	62	12
49	22	M	75	510	109	57	1
50	22	M	73	632	139	63	2
51	25	M	75	807	175	79	7
52	27	M	82	691	211	100	8
53	29	M	86	718	201	87	10
54	32	F	96	917	112	57	9
55	32	M	60	762	156	89	0
56	32	M		714	217	76	7
57	34	F	60	715	177	90	4
58	35	M		679	163	94	5
59	36	F		555	140	75	0
60	38	M	62	606	138	66	4
61	41	M	93	789	138	69	4
62	43	M	87	778	165	79	8
63	45	M	54	560	169	78	4
64	47	M	77	686	104	51	4
65	48	M	53	622	117	63	5
66	49	M	50	714	131	59	6
67	51	M	71	782	148	62	1
68	52	F	64	779	169	93	11
69	53	F	39	619	100	50	5
70	55	M		675	136	69	2
71	55	F	44	571	119	44	4
72	55	F	54	623	142	55	5
73	59	M	73	647	124	59	1
74	64	M	66	701	101	37	2
75	64	M	52	592	123	71	4
76	64	M	73	714	137	72	11
77	67	M	65	677	123	68	8
78	68	M	70	548	94	55	7
79	68	M	72	481	159	72	5
80	69	M	90	410	119	54	1
81	70	M	57	529	104	48	2
82	70	M	48	743	127	64	7
83	72	F	48	437	107	55	1
84	75	F	63	621	89	56	2
85	77	F	50	522	98	50	2
86	78	F	32	631	87	38	0
87	82	F	45	762	62	35	11
88	82	M	50	670	141	77	9
89	84	M	48	577	64	44	4
90	84	F	48	636	112	54	4
91	85	F	55	523	98	41	7
92	90	M	55	560	89	45	5
93	91	M	68	735	146	79	12
94	92	F	35	858	124	57	14
95	93	F	45	535	128	60	1
96	95	F	55	492	59	28	3

in number immediately after puberty, and a slower decline thereafter. The patches never entirely disappeared and in the oldest patient examined, a 95-year-old woman, 59 patches were clearly visible throughout the small intestine.

It was not possible to demonstrate any close relationship between the number of patches found and the patient's sex, body weight, and length of small intestine.

SIZE The mean number of large patches containing more than 25 follicles varied from over 80 before 20 years of age to around 50 at 70 to 95 years of age. The reduction in number of large patches with age

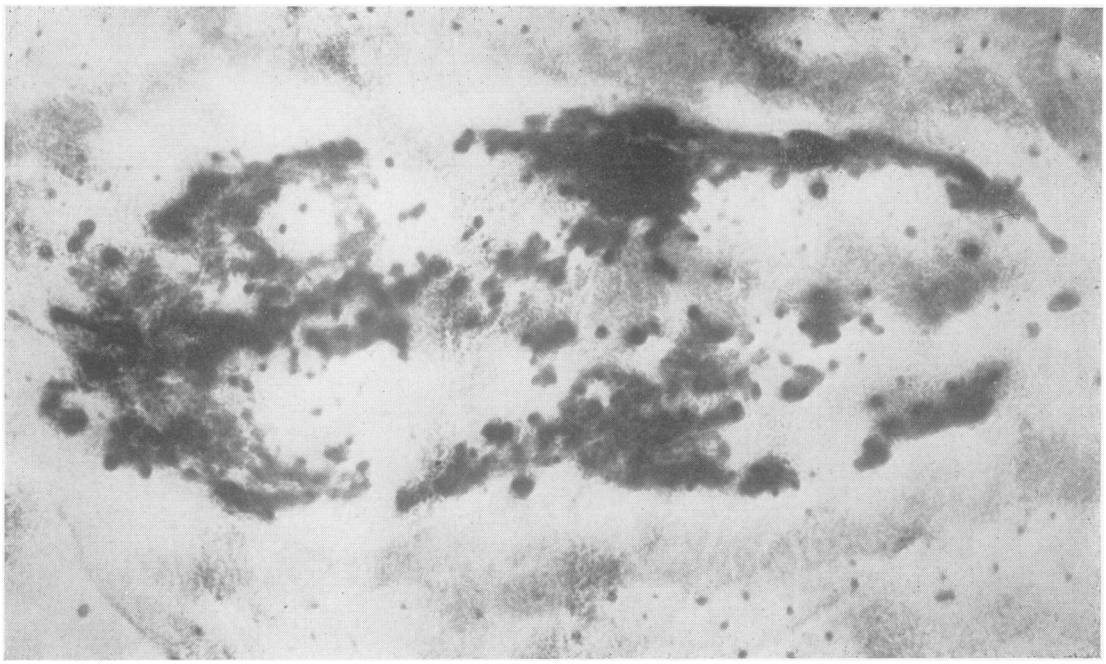

FIG. 2. *Peyer's patch from a 78-year-old woman (case 86), showing loss of lymphoid follicles due to age. Methylene blue staining and transillumination (× 4).*

roughly paralleled the reduction in number of the smaller patches with the exception of really large patches measuring more than 4 cm. in length.

Large patches measuring more than 4 cm. in length were found more frequently after puberty than before it. The longest patch found before puberty was only 9·9 cm. in length. After puberty patches measuring more than 10 cm. in length were found in 12 of the 58 specimens examined. The longest patches, found in cases 47, 48, 56, and 68, measured 28, 20, 16, and 17 cm. respectively. These long patches persisted into old age and were, if anything, more numerous than in middle life. The longest patches found in cases 92 to 96 measured 9·5, 5·9, 9·6, 4·1, and 8·2 cm. respectively.

DISTRIBUTION The relative distribution of Peyer's patches in the duodenum, jejunum, and ileum was similar to that found in children. With increasing age there was a gradual and fairly equal reduction in the number of patches found in all parts of the small intestine.

FOLLICULAR PATTERN The thick papillary patches occasionally found before puberty were not found in adults. The patches were flatter, and, in the unwashed specimen, less distinct than in children. With increasing age there was a gradual loss of lymphoid follicles from within the patches giving rise to moth-eaten patches of bizarre shape and appearance (Fig. 2). The mucosa covering these bare areas showed a reversion from the usual flattened epithelium to a papillary type again. In some cases the large patches appeared to be completely fragmented and replaced by collections of smaller ones.

DISCUSSION

The effect of age on Peyer's patches in the human small intestine appears to be similar to the effect of age on lymph nodes in other parts of the body, particularly deeply situated glands. Denz (1947) showed that there was very little atrophy in the deep cervical nodes until at least 60 years of age, and that inactive germinal centres could still be found at the age of 80.

The effect of age on Peyer's patches in the human small intestine also appears to be similar to the effect of age on the solitary follicles in the large intestine. Dukes and Bussey (1926) found that the number of solitary follicles in the large intestine varied from about 8 per sq. cm. in children to 4 per sq. cm. in young adults and 3 per sq. cm. in people from 60 to 88 years of age.

No detailed study of the effect of age on Peyer's patches in the animal intestine has been reported.

In a limited study Andreasen (1943) could find no pronounced age atrophy in the Peyer's patches of his experimental rats. Carlens (1928) found that with increasing age there was a slight falling off in weight of the Peyer's patches in his cows and pigs.

The results of this investigation show that there are plenty of Peyer's patches in elderly people and that, far from disappearing entirely, large patches measuring more than 4 cm. in length are usually present.

SUMMARY

Fifty-eight specimens of normal small intestine from patients between 15 and 95 years of age were examined for the presence of Peyer's patches.

The mean number of patches containing more than five lymphoid follicles varied from over 200 before 20 years of age to around 100 between 70 and 95 years of age.

With increasing age there was a loss of follicles from the Peyer's patches giving patches of unusual shape and appearance.

Peyer's patches were easily seen in old people, and patches measuring more than 4 cm. in length were usually present.

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